FIREBALLS IN JANUARY.

APART from the rich shower directed from the region of Bode's asterism Quadrans, or northern limits of Boötes, on the opening nights of January, the meteors visible in this month have usually attracted little attention. Observers who have watched the cold winter sky have, indeed, generally remarked a scarcity of meteors amongst the beautiful constellations displayed at this season of the year. Zezioli, it is true, was more successful in the clear atmosphere of Italy, for on the closing nights of January, 1868, he saw a plentiful swarm of shooting stars falling from Corona and Ursa Major, and one or two other observers have occasionally recorded meteoric activity of somewhat special character, but, with the exception of its New Year's shower, the month commonly furnishes us neither with any plentiful displays nor with an abundance of meteors giving evidence of a multitude of attenuated streams.

But in recent years January has certainly shown itself rather noteworthy on account of the brilliant fireballs which have appeared. This month in 1901, 1903 and 1904 proved rich in these startling visitors. About ten were seen in 1901, five were well observed and their real paths computed in 1903, and seven appeared between January 8–22, 1904. We must also remember the great fireballs of 1894 January 25, 1898 January 21, and the pair which were quite conspicuous in bright sunshine on the early afternoons of 1900 January 9 and 1901 January 6 respectively.

A comparison of the various dates shows that the apparitions have marked two periods of the month, viz.

January 6 to 15, and
January 23 to 29.

In future years it will be desirable to watch for fireballs at these special epochs. No particular shower appears to have been responsible for their production in past years. The radiant points seem to have been widely separated, and prove that our brilliant January meteors have little if any community of origin, but may rather be regarded as isolated cosmic rovers. If they individually represent meteoric showers, such showers must form the relicts of rich, old-time systems now thinned out beyond visible recognition by frequent *rencontres* with the planets.

It is characteristic of many vividly luminous fireballs that they have very slow, long and nearly horizontal flights. Their average heights are about 67 miles at first, and they disappear either at about 46 or 29 miles. Their radiant-points are usually not far from the horizon, and placed in unusual westerly positions where no ordinary radiants of shooting stars are ever detected. In 1903 very brilliant meteors were seen on January 10, 13, 14, 25 and 28, and in 1904 on January 8, 9, 10, 13, 15, 18 and 22. The one alluded to in NATURE for January 14 as seen by Mr. W. E. Rolston at Fulham on January 9, 8h. 27m., was also observed by Mr. G. F. Oldham at Tunbridge Wells, moving from 110°+36° to 128°+37° in four seconds. The real height of the object during its luminous career was from 60 to 41 miles over the east coast of Kent (Folkestone to Ramsgate), radiant point at 41°+5°, and velocity certainly not more, and very probably less, than 6 miles per second. There was another fireball on the following night, Sunday, January 10, at 8h. 32m., observed at Oxford and Llanelly. It descended from a radiant in the east region of Aries over Monmouthshire from a height of 67 to 31 miles. Yet another fireball was recorded on January 15 at Bridgwater and Banbury. It fell from a height of 63 to 27 miles from a radiant near the zenith in the region bordering Perseus and Auriga.

It is fortunate to have secured duplicate observations of these fine objects, and more of them may be expected to appear before the close of the month.

In February fireballs have often been seen on the 3rd, 7th and 10th. These dates will nearly correspond with February 5. 9 and 12 in 1904. There is also a pretty rich shower of meteors from near Capella sometimes observed between February 7 and 23.

W. F. DENNING.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

PROF. EDUARD STUDY, of Greifswald, has been appointed to the chair of mathematics at Bonn in succession to the late Prof. Lipschütz.

ON Thursday, February 11, Prof. Armstrong will give an address at the Battersea Polytechnic on "The Placing of 'Domestics' on a Scientific Practical Basis."

CORNELL University will, says *Science*, receive more than 40,000*l*. from the estate of the late Mr. F. W. Guiteau, of Irvington-on-the-Hudson, which is nearly 10,000*l*. more than was announced at the time of Mr. Guiteau's death last year. The money will be used as a fund for the assistance of needy students, and will be lent them without interest.

DR. GEORG SCHROETER has been appointed professor of organic chemistry in the University of Bonn; Mr. F. Kreutzberg, of Düsseldorf, has been appointed professor of applied mathematics at the new Academy of Posen; Dr. Leo Marchlewski, professor of chemistry at Cracow; Mr. L. Farny, professor in the Zürich Polytechnic; Dr. W. Kötz, professor of chemistry at Göttingen; and Dr. Erich Müller, professor in the chemical department of the Dresden High School.

A PETITION, which it is intended to present to the central educational authorities of the United Kingdom, is being circulated for signature among the registered medical men of the British Isles. The petition directs attention to the serious physical and moral conditions of degeneracy and disease resulting from the neglect and infraction of the elementary laws of hygiene, and urges the central authorities for education to consider whether it would not be possible to include in primary and secondary schools such teaching as may lead all children duly to appreciate healthful bodily conditions. The petition then reviews the steps taken in this direction by English-speaking nations, and shows that great prominence is given in many British colonies to instruction in the laws of health, and concludes by urging the necessity of ensuring that the training of all teachers shall include adequate instruction in these subjects.

AT the annual meeting of the Mathematical Association held on January 23, Prof. A. R. Forsyth, the president, who occupied the chair, in referring to the report of the Committee on the Teaching of Elementary Mathematics, said that in the various stages of the consideration of changes in the regulations at Cambridge University the report of the association proved to be of substantial value. The most interesting event outside the association was the production of the report of the syndicate at Cambridge and the discussion of that report. Some slight modifications were introduced into it, and then it was adopted by the University of Cambridge without a single dissentient. Therefore there had come a change not indeed in teaching, but in the conditions under which teaching could be carried on. If the first working of the regulations was carried out in the spirit in which they were proposed, if the teachers would take the advantage that was offered by the greater ease of the regulations, he thought a substantial improvement would come in the mathematical teaching of the country. Mr. E. M. Langley exhibited models of regular and semi-regular solids, including the four *polyèdres étoiles* of Poinsot. Mr. C. S. Jackson read an account of a recent discussion on the possibility of fusion of the teaching of mathematics and science. Mr. J. C. Palmer dealt with a geometrical note, and Mr. C. A. Rumsey read a paper on advanced school courses of mathematics.

IN the course of an address at the Mansion House on Monday, at the distribution of prizes to the successful students of the City and Guilds Institute, Sir William White remarked that as regards higher technical education we were as a nation in a critical condition. What was wanted was coordination of educational agencies on a carefully considered plan. There must be conference between teachers and the representatives of the professions, businesses, and manufactures if the best results were to be obtained. He was extremely hopeful of the results which would follow the work of an advisory committee at the Institution of Civil Engineers containing re-

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presentatives of all the great engineering associations in this country, the duty of which it would be to report as to the best mode of training British engineers in the future. We had at present no proper system of secondary education preparing students for entering technical institutes. In this respect the Germans had certainly stolen a march upon us. We should cease arguing for ever whether the classical side or the modern side of education was the best. The simple solution was that they should go on side by side. There should be a more generous recognition by employers of the necessity and value of the services of trained men. It was a sad thing to know that some of the researches originally made in this country had been first turned to practical account abroad. He knew one case where British manufacturers were to this day paying large royalties in connection with a process of steel manufacture which was actually initiated in England. He looked forward to a system of technical education in London and throughout the country which would show the world that England was still the leader in industry and in resource.

SOCIETIES AND ACADEMIES.

LONDON.

Mathematical Society, January 14.—Dr. E. W. Hobson, vice-president, in the chair.—The following papers were communicated:—Various systems of piling: Prof. J. D. **Everett.** The method of "steps" for dealing with the structure of piles of equal spheres is applied to various arrangements which are of especial interest in crystallography.—The notion of lines of curvature in the theory of surfaces: Dr. G. **Prasad.** The object of the paper is to investigate conditions under which certain known theorems in the theory of surfaces can be extended to the case in which the coordinates of points on the surface are defined by non-analytical functions. The theorems in question are:—(1) The only surface of constant positive curvature is a sphere; (2) no surface of constant negative curvature with continuously varying tangent plane can extend to infinite distances.—Electric radiation from conductors: H. M. **Macdonald.** It is shown that in general, when electrical oscillations on a conductor are taking place, no surface can be drawn to cut the lines of electric force at right angles and to be everywhere close to the surface of the conductor. If such a surface could be drawn there would be no decay of the oscillations by radiation. It is shown that surfaces can be drawn to have the property in question everywhere except near the nodal points of the oscillation, and it is concluded that the radiation takes place mainly in the neighbourhood of the nodes. It is pointed out further that the ordinary theory of electrical waves along wires involves an invalid limiting operation, by which the wires are treated as indefinitely thin and the electric force is taken, nevertheless, to be everywhere at right angles to the wires; and the correction of the ordinary theory required to avoid this operation is discussed.—Groups of the order $p^{\alpha}q^{\beta}$: Prof. W. **Burnside.** By a consideration of certain properties of the group-characteristics of groups of the orders in question, it is shown that all these groups are soluble.—The solution of partial differential equations by means of definite integrals: H. **Bateman.** The paper deals with various generalisations of the known solutions of Laplace's equation by means of definite integrals.—Open sets and the theory of content: Dr. W. H. **Young.** Two definitions of the content of an open set are given, and are shown to be in agreement for that class of open sets which has the property that the content of the set, obtained by adding to any member of the class any set of non-overlapping intervals, is equal to the sum of the contents of the component sets. This class contains all known open sets, and all those obtainable from them by any of the ordinary processes.—Upper and lower integration: Dr. W. H. **Young.** All functions, whether integrable or not, possess upper integrals and lower integrals. The problem of determining them is reduced in the paper to that of ordinary integration. It is shown that an upper n-ple integral of a discontinuous function can be expressed in terms of $\int I dk$, where I is the content of the set of points at which the maximum of the function is not less than k, and the integral is taken between suitable limits.—List of primes of the form $4n+1$ between 10^8 and 10^8+10^3: Dr. T. B. **Sprague.**

PARIS.

Academy of Sciences, January 18.—M. Mascart in the chair.—The application of the general theory of the flow of sheets of water infiltrated in the soil to large springs of permeable strata, and, in particular, to several of those supplying Paris: J. **Boussinesq.** The mathematical theory previously worked out by the author has been applied to the three sources of Dhuis, Cérilly, and Armentières. It is found that for important springs in permeable ground the basin of supply is considerably extended downwards below its edge.—On the first numbers of the photographic catalogue of the sky published by M. Trépied: M. **Lœwy.**—On the dispersion of the n-rays and on their wave-length: R. **Blondlot.** The dispersion was studied by means of aluminium prisms and lenses, and it was recognised that the radiation was separated into eight bundles, the refractive indices of which varied from 1·04 to 1·85. The wave-lengths were determined by two methods: by a diffraction grating and by the formation of Newton's rings. The results of the two methods were concordant within the limits of experimental error, the wave-lengths determined proving to be much shorter than those of light. These radiations would appear to be different from the rays of very short wave-length discovered by M. Schumann, inasmuch as the latter are strongly absorbed by air and the n-rays are not.—On the peroxides of zinc: M. **de Forcrand.** A discussion of the results of M. Kuriloff with regard to the formula of peroxide of zinc.—On a characteristic property of the families of Lamy: Alphonse **Demoulin.**—On the *genre* of the derivative of an entire function and on the exceptional case of M. Picard: A. **Wiman.**—The action of radium bromide on the electrical resistance of bismuth: R. **Paillot.** The radiations emitted by radium bromide diminish the electrical resistance of bismuth. The action is practically instantaneous, rapidly falling off with the distance of the radium tube from the bismuth and vanishing when this distance amounts to 1 cm.—On a self-recording differential speed measurer: J. **Richard.**—The influence of the physical nature of the anode on the constitution of electrolytic peroxide of lead: A. **Hollard.** If the lead were deposited as the dioxide, the analytical factor would be 0·866 to convert the dioxide into lead. Experiments with an anode of roughened platinum gave a factor of 0·853, this being independent of the amount of lead in solution.—The chemical nature of colloidal solutions: Jacques **Duclaux.**—A method of separating alumina and iron by the use of formic acid: A. **Leclère.** A modification of the hyposulphite of sodium method, in which the aluminium is separated as the basic formate.—The estimation of chlorates, bromates, and iodates: Léon **Débourdeaux.**—The preparation of primary alcohols by means of the corresponding amides: L. **Bouveault** and G. **Blanc.** The higher fatty amides, reduced by sodium in boiling ethyl alcoholic solution, give yields of from 25 to 30 per cent. of the theoretical. Normal hexyl, normal nonyl, and phenylethyl alcohols were prepared in this way.—The synthesis of sugars, starting from trioxymethylene and sulphite of soda: A. **Seyewetz** and M. **Gibello.**—A new method of synthesis of tertiary alcohols by means of organomagnesium compounds: V. **Grignard.** The magnesium compound R.MgX is converted into $R.CO_2.MgX$ by the action of carbon dioxide, and this is then treated with an additional molecule of $R'.MgX$, the object being to prepare the ketone $R.CO.R'$. The reaction was found, however, to result in the production of the tertiary alcohol $R.R'_2.OH$. The new alcohols prepared by this method include diethylisoamyl carbinol, isobutyldiisoamyl carbinol, and phenyldiethyl carbinol.—The influence of radium rays on the development and growth of the lower fungi: J. **Dauphin.** The radium rays arrest the growth of the mycelium of Mortierella, but the spores and mycelium are not killed, but are in a latent state, and, replaced under normal conditions, can germinate and continue to grow.—Researches on the transpiration of the leaves of Eucalyptus: Ed. **Griffon.** In opposition to the views generally expressed, it is found that the leaves of Eucalyptus have not an unusually large transpiratory capacity com-

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